STUDY OF THE JOINT ADMINISTRATION OF HIPRAVIAR® SHS WITH RESPIRATORY VACCINES FOR PREVENTING NEWCASTLE DISEASE AND INFECTIOUS BRONCHITIS

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1 INTRODUCTION

The need to reduce the number of days of vaccination in broiler flocks has led to the proposal of studies for defining the possible joint administration of a vaccine for preventing avian pneumovirus vaccine and other types of respiratory vaccines. Up to now, these vaccines have been administered separately in order to minimize interaction between them. In principle, the fact that they all compete for the same receptors would imply that there would be interaction between them and, in the end, the protection afforded against pneumovirus could be affected.

However, our tests have enabled us to discover that there is not sufficient interaction to impair the safety and efficacy of these vaccines when jointly administered. In this present study, we assess the safety and efficacy of joint administration. To do so, we evaluate the presence of respiratory reactions after vaccination. We also evaluate efficacy by means of the presence of clinical signs after challenge.

2 MATERIAL AND METHODS

Vaccines: The following vaccines for poultry were used in the study:

HIPRAVIAR® SHS:
Live vaccine against Pneumovirus. (Subtype B $> 10^{2.4}$ $TCID_{50}$)

HIPRAVIAR® CLON:
Live vaccine against Newcastle disease (strain clon CL/79 $> 10^{6.5}$ EID_{50})

HIPRAVIAR® CLON/H120:
Live vaccine against Newcastle disease (strain clon CL79 $> 10^{6.5}$ EID_{50}) and Infectious Bronchitis (strain H-120 $> 10^{3}$ DIE_{50}).

Poultry: We used a total of 100 commercial broilers from a commercial hatchery with health control for the study. The chicks were from breeder flocks vaccinated against the three diseases under study. After applying the various vaccines, the birds were housed in four different isolation units. Immunisation groups were as follows (A) 10 broilers; (B) 20 broilers; (C) 30 broilers and (D) 40 broilers.

Vaccination: the vaccines were reconstituted following the manufacturer's instructions. Each vial was reconstituted in a 30-ml dropper with sterile solution. In the case of joint administration, two or three vials were reconstituted in the same dropper and administered by ocular route. The following vaccination programmes were applied to the different groups at one day of age:

Group	Vaccinations
A	HIPRAVIAR® SHS
B	HIPRAVIAR® SHS + HIPRAVIAR® CLON
C	HIPRAVIAR® SHS + HIPRAVIAR® CLON /H120
D	Non-vaccinated

Challenge: the challenge took place 21 days after vaccination. In order to do so, the following challenge groups were designed that, for reasons of availability of isolation units, had to be housed together for each challenge virus:

Challenge group	A	B	C	D	Total
SHS	10	10	10	10	40
ND		10	10	10	30
IB			10	10	20
Not challenged				10	10

Challenge strains: The challenge strains used against avian pneumovirus were virulent subtype B administered at a rate of 10^{4} CD_{50}/0.2 ml per chick by oral route. The Newcastle disease challenge strain was the Herts strain administered at a rate of $10^{5.3}$ EID_{50} /0.2ml per chick by intramuscular route. The Bronchitis challenge strain was the M41 strain at a rate of 10^{4} EID_{50} /0.2ml per chick by ocular route.

3 RESULTS

Safety assessment

After vaccination, the birds were observed daily for 10 consecutive days to determine the presence of clinical signs attributable to the joint administration of the vaccines.

The following evaluation criteria were used to assess the presence of the vaccine reactions:

1. Presence of mild clinical signs (watering eyes).
2. Presence of moderate clinical signs (respiratory symptomatology with coughing, panting, etc.).
3. Presence of severe clinical signs (severe respiratory symptomatology and depression).

Group A: ● Vaccination with HIPRAVIAR® SHS

Score/Days PV	1	2	3	4	5	6	7	8	9	10
1	-	-	-	-	1/10	1/10	1/10	-	1/10	-
2	-	-	-	-	1/10	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-

Group B: ● ● Vaccination with HIPRAVIAR® SHS+ HIPRAVIAR® CLON

Score/Days PV	1	2	3	4	5	6	7	8	9	10
1	1/10	1/10	1/10	1/10	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-

Group C: ● ● Vaccination with HIPRAVIAR® SHS+ HIPRAVIAR® CLON /H120

Score/Days PV	1	2	3	4	5	6	7	8	9	10
1	-	-	1/10	1/10	1/10	-	-	-	-	-
2	-	-	-	2/10	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-

Group D: ● Non-vaccinated

Score/Days PV	1	2	3	4	5	6	7	8	9	10
1	1/10	-	1/10	1/10	1/10	-	-	-	-	-
2	-	-	-	-	-	-	-	1/10	-	-
3	-	-	-	-	-	-	-	-	-	-

Very mild clinical signs were observed in one bird, but significant differences were not observed between the groups vaccinated with the various vaccine programmes and the non-vaccinated group. Hence, it can be concluded that joint administration of various vaccine viruses does not increase respiratory type reactions.

Efficacy assessment

After each challenge, the birds of each group were observed for 10 consecutive days to determine:

- Mortality
- Presence of clinical signs

Assessment of the challenge against avian pneumovirus:

Assessment of clinical signs
The following criteria were used to assess the clinical signs from the challenge with avian pneumovirus:

1. Little nasal discharge
2. Moderate nasal discharge
3. Abundant nasal discharge
4. Turbid nasal discharge
5. Ocular discharge
6. Swollen sinus
7. Mortality

Groups/Days	1	2	3	4	5	6	7	8	9	10
A	-	-	-	0.1	-	1/10	-	-	-	-
B	-	-	-	0.1	0.2	-	-	-	-	-
C	-	-	-	-	-	0.2	-	-	-	-
D	-	-	1.1	1.3	1.4	2.6	2.2	3	3.2	3.3

The vaccinated groups showed little symptomatology whereas various levels of nasal discharge oscillating from level 1 to 3 was observed in the control group. Mortality was not recorded in any case.

Assessment of the challenge against Infectious Bronchitis:

The presence of clinical signs and ciliastatic activity in the trachea after the challenge were assessed. We used the following criteria to assess the presence of clinical signs after the challenge:

1. Presence of mild clinical signs (watering eyes)
2. Presence of moderate clinical signs (respiratory symptomatology with coughing, panting, etc.)
3. Presence of severe clinical signs (severe respiratory symptomatology and depression)

Groups/Days	1	2	3	4	5	6	7	8	9	10
C	0	0	0	0.2	0.1	0.2	0	0	0	0
D	0	0	0.1	0.3	0.5	0.4	0.3	0	0	0

The challenge group clearly showed a higher incidence of clinical signs than the control group.

We used the following assessment criteria to evaluate ciliastatic activity in the trachea:

0: All cilia showed activity
1: 75% of the cilia showed activity
2: 50% of the cilia showed activity
3: 25 % of the cilia showed activity
4: None of the cilia showed activity

Groups/Days	1	2	3	4	5	6	7	8	9	10
C	0	1	0	1.4	1	1	1.2	0	0	0
D	0	0	0.1	1.3	0.9	1.8	1.6	1.4	1.2	0

In this case, differences in ciliastatic activity were not as pronounced between the vaccinated group (three live vaccines) and the challenged group. This leads us to conclude that the evaluation of efficacy by measuring ciliastatic activity may not be adequate for the situation.

Assessment of challenge against Newcastle disease:

Assessment of clinical signs

In the case of Newcastle disease, we evaluated the mortality observed after the challenge:

Groups/Days	1	2	3	4	5	6	7	8	9	10
B	-	-	-	-	-	-	-	-	-	-
C	-	-	-	1/10	-	-	-	-	-	-
D	-	-	1/10	1/10	3/10	1/10	2/10	-	-	-

The two vaccinated groups were protected against the challenge, whereas 80% mortality was observed in the non-vaccinated group.

4 CONCLUSIONS

Vaccinated birds showed no obvious clinical signs attributable to joint vaccination. This indicates that combined vaccination with different products did not produce any post-vaccination reactions under the experimental conditions. Complete protection against the challenges for each group after administration of different combinations of vaccines was observed in our experiment.

This study provides a first approach to the safety and efficacy of the combination of respiratory vaccines. We should note that this is an experimental study and environmental and epidemiological parameters were controlled. It would also be appropriate to assess the effectiveness of such combined programmes at a field level due to increased interaction with other infectious agents and other factors that cannot be taken into account in our study.

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